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ORIGINAL ARTICLE

A versatile modification of dermoglandular hammock flap for mastopexy: Extended hammock

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Abstract

Breast ptosis commonly develops in response to ageing and breastfeeding. Clinical studies now focus on both filling the upper pole of the breast with parenchymal flaps and long-term maintenance of the breast projection without recurrence of upper pole concavity and a significant change in breast shape over time. This study presents a modification for a well-known mastopexy technique, the dermoglandular hammock flap, which provides not only autoaugmentation for the breast but also suspension for the breast parenchyma. This technical modification involving a hammock flap extended in both width and length dimensions, was performed in 17 patients aged 28–43 years with an average age of 31 years. They had minimal, moderate, and severe ptosis. Of these, eight patients had mastopexy only without needing any resection of the breast tissue. In four patients, there was significant asymmetry, needing excision of the breast tissue. In five patients, it was necessary to resect less than 290 g of glandular tissue from both breasts to provide enough reduction of the breast volume. There were no severe complications either in the early or late postoperative period, such as nipple-areolar necrosis, haematoma, infection, or dehiscence of the suture line. However, in one patient, skin depression developed at the end of the vertical scar line in one breast. In the follow-up, medial and upper pole fullness of the breast maintained without recurrence of the ptosis, providing satisfactory shape and projection. With this modification, dermoglandular suspension flap turns to be a more effective procedure and suitable for all types of ptosis. As the sagged lower pole of the breast is used as a flap behind the nipple-areola complex and upper pole, it makes not only parenchymal reposition, but also autoaugmentation in the breast, leading to successful breast fullness.

Key Words: Ptosis, breast, dermoglandular flap, vertical scar

Introduction

Breast ptosis commonly develops in response to ageing and breastfeeding. As a result, the nipple, skin, and glandular tissue descend to the lower pole of the breast due to the elongation and stretching of the ligamentous structures of the breast, leading to reduced upper pole volume, bulky lower breast, and excess skin. Many mastopexy techniques have been described for the correction of breast ptosis, which aims to restore the shape and volume of the breast. However, there is no ideal mastopexy procedure applying to all breasts. In restoration of the breast shape, ptotic breast tissue is lifted and tightened, skin envelope is reduced, and the nipple is placed to an aesthetically correct position on the new breast mound, so that a pleasing aesthetic contour can be created [1].

Many clinical studies now focus on both filling the upper pole of the breast with parenchymal flaps and long-term maintenance of the breast projection without recurrence of upper pole concavity and a significant change in breast shape over time. It is necessary to suspend the mammary gland effectively after raising or augmenting it to provide a long-term stable breast shape. Different suspension techniques and breast parenchymal flaps have been suggested, including dermal flaps, suspension sutures, muscle flaps, facial flaps, silicone mesh, or sheets in order to avoid stretching of the skin over time, which causes breast deformity and ptosis relapse [1-5]. Dermogladular hammock flap technique is a well-known mastopexy procedure involving a dermoglandular flap, which provides not only autoaugmentation for the breast but also strong dermal suspension for the breast parenchyma. In this study, we described a modification for dermogladular hammock flap in order to make it more effective, widely acceptable and suitable for various mastopexy patients. It was extended in both width and length dimensions, leaving only a short vertical scar.

Patients and methods

Markings

The patient is preoperatively marked for a vertical mastopexy in standing position. First, the nipple–areola complex is drawn for reduction to the desired size (diameter of 4–5 cm), and then the breast meridian, midline, and inframammary fold are marked on the breast. New nipple site is placed at 20–23 cm from the sternal notch on the breast meridian according to the patient's level of inframammary fold. The circumference of the proposed areola is marked as a mosque dome shape by using the rules of the Lejour's marking, whose length is less than 16–18 cm (Figure 1). On the lower breast, lateral and medial extensions of the skin marking are determined either by simply pinching the excess skin or by using Lejour's marking principles, in which the lateral line is extended down by moving the breast up and medially and for the medial line, the breast is moved up and laterally. The width of the skin excision varies according to the size of the breast. Margins of the skin excision are joined to each

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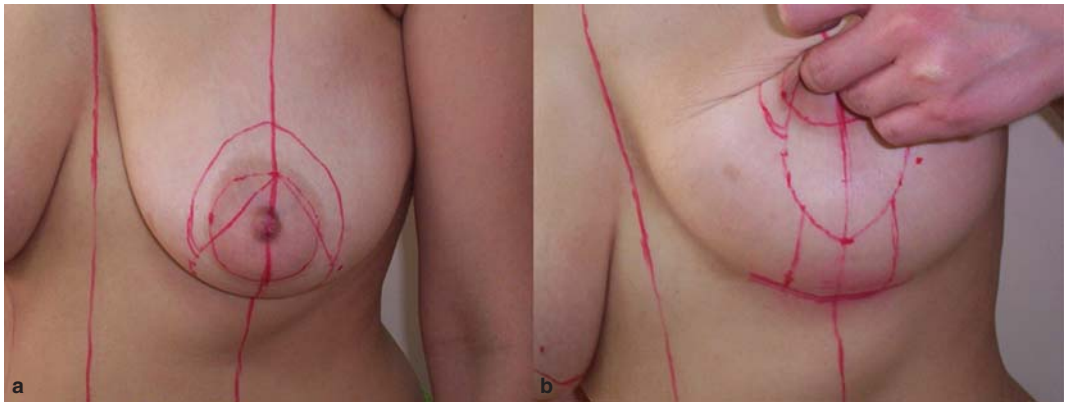

Figure 1. (*a*, *b*) Marking of the upper and lower breast. Note the subcutaneous margins of the lower part of the dermoglandular flap, for which parallel lines are drawn from the medial and lateral margins of the skin excision to the inframammary fold.

other at 3–4 cm cephalad to the inframammary fold on the breast meridian. For the marking of the subcutaneous margins of the lower part of the dermoglandular flap, parallel lines are drawn from the medial and lateral margins of the skin excision to the inframammary fold. The distance between two lines is ~ 5–6 cm, which determines the width of the distal flap as a subcutaneous extension including only glandular tissue without dermis.

Operation

The operations were carried out under general anaesthesia and in supine position in which the arms were abducted and supported on an arm board. Preoperatively, an intravenous antibiotic was given 30 minutes before the incision. First, skin incision was placed around the nipple–areolar complex, and then continued along the marked lines. The skin in the marked lines was de-epithelialised except for the nipple–areolar complex. Incision at the lower part of the breast deepened 1–1.5 cm through the breast tissue surrounding the de-epithelialised lower breast. On the upper breast including the shape of the mosque dome, the skin incision involved only the superficial part of the skin, allowing de-epithelialisation. Between the lowest border of the skin markings and the inframammary fold, a skin flap was raised 1–1.5 cm in thickness without compromising the viability of the flap, whose thin dissection in this area could reduce the incidence of a dog-ear. Subcutaneous dissection extended inferiorly

Figure 2. (*a*) Appearance of the breast after de-epithelialisation. (*b*) The dermoglandular hammock flap harvested from the lower breast with the subcutaneous dissection extended down to the inframammary fold. (*c*, *d*) After a prepectoral tunnel in the superior and medial direction was prepared, the extended hammock flap was transposed into the pocket and then secured to the pectoral muscle with sutures.

Figure 3. Immediate postoperative appearance of the mastopexy. Note the significant projection in the breasts.

to the inframammary fold and 3–5 cm far from the lateral and medial borders of the planned dermoglandular flap. After the skin dissection was entirely completed, outer lines of the de-epithelialised area below the shape of the mosque dome were incised bilaterally through the pectoral muscle and incisions continued subcutaneously on the lateral and medial borders of the planned glandular flap. Later, the flap elevation started at the inframammary fold, leaving a thin layer of tissue over the pectoral muscle under the dissected skin flap to avoid the possibility of skin depression on the new inframammary fold. When this superior pedicle dermogladular flap, which was a quadrangular shape, was freed completely from the prepectoral area and lateral pillars, a pocket was dissected over the pectoralis muscle under the central and upper breast (Figure 2). The breast tissue was detached from the pectoral muscle up to the first intercostal space in a superior and medial direction. Then, the superior base dermoglandular flap was transposed into the pocket and its dermis was sutured with 4–6 resorbable stitches to the pectoral muscle, ensuring fullness for the medial pole and the central portion of the breast, which would maintain in the late postoperative period. For the breast reduction, or in need of providing symmetry, abundant tissue was resected from the lateral and medial pillars, as well as the base of the breast. After removing the excess breast tissue, medial and lateral pillars were attached to each other to create a conical shape. The nipple–areola complex was sutured to the desired location by way of closing the dermal and epidermal layers separately with absorbable sutures. After placing a suction drain, the vertical incision line was closed with a subcuticular suture by way of gathering the suture line, leading to a short vertical scar (Figure 3).

Results

This technique was performed in 17 patients aged 28–43 years with an average age of 31 years. They had minimal, moderate, and severe ptosis. Of these, eight patients had mastopexy only without needing any resection of the breast tissue. In four patients, there was significant asymmetry, needing excision of the breast tissue no more than 220 g/breast to obtain proper symmetry. In five patients, it was necessary to resect less than

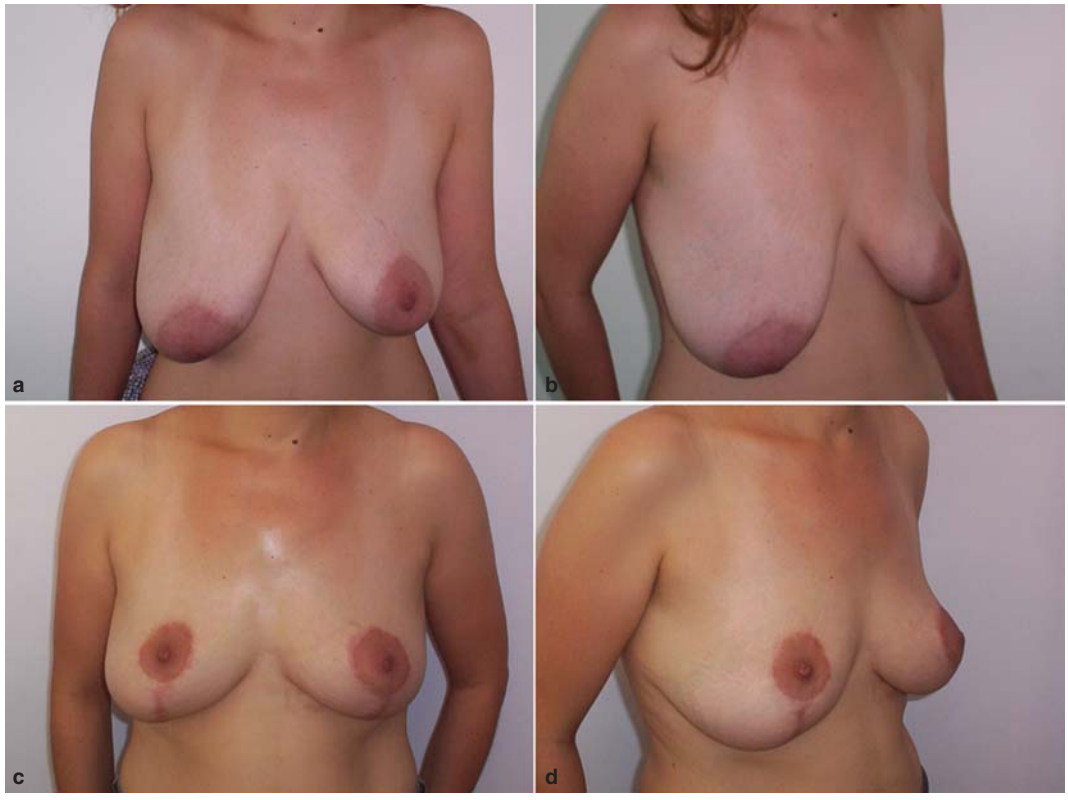

Figure 4. (*a*, *b*) Preoperative images of a 37-year-old patient, who had significant breast asymmetry, as well as ptosis. She had mastopexy with an extended hammock flap in which 220 g breast tissue was excised from the right breast to obtain proper symmetry. (c, d) Views 29 months postoperatively. Note the good upper pole fullness, breast projection, and contour.

290 g glandular tissue from both breasts to provide enough reduction of the breast volume because of the breast hypertrophy associated with ptosis, upper pole concavity, excess skin, and glandular descent. There were no severe complications either in the early or late postoperative period, such as nipple–areolar necrosis, haematoma, infection, or dehiscence of the suture line. However, in one patient, skin depression developed at the end of the vertical scar line in one breast due to the excessive resection of the breast tissue from the lower prepectoral area during the dissection of the glandular extension of the flap. In another patient, at the beginning of the vertical scar line next to the areola, healing was delayed and a visible scar left in one breast. In the early postoperative period, excessive upper pole and central breast fullness developed, also at the lower margin of the breast in the vertical suture line, a dermoglandular notch occurred due to the dermoglandular suspension of the breast tissue. In 3 weeks, the notch of the lower margin resolved completely, while excessivity of the upper and central breast was turning to an acceptable breast fullness. Patients were followed between 8–29 months with an average of 15 months. In this period, a stable breast shape was seen without recurrence of the ptosis (Figures 4,5,6).

Discussion

Various mastopexy techniques have been described to achieve a three-dimensional improvement in ptotic and sagging breasts, most of which use either dermal or skin support to maintain breast contour and projection in time. However, gravity and the thrust of the lower breast bulk alter the breast shape with time, resulting in recurrence of breast ptosis, although contour and projection of the breast are often good early after the operation. Techniques involving glandular reshaping combined with suspension of the breast provide a more stable and better breast shape and projection with lower recurrence rates. Dermal bra technique is a useful method for reduction mammaplasty and correction of ptosis. It raises the mammary gland and suspends it on the pectoralis major muscle effectively with the dermal support. It has been claimed that the technique decreases tension of the periareolar skin and reduces the recurrence rate of secondary ptosis [6]. However, it does not carry the sagged inferior breast tissue from the lower pole to the upper, while simply raising the breast tissue up. Colwell and Breuing [7] used internal autologous or cadaveric dermal slings to circumferentially support and shape the breasts for long-term breast projection and upper pole fullness in 10 patients. In this mastopexy procedure, the medial and lateral wings of the wise pattern mastopexy are de-epithelialised and brought superiorly around the breast, and then tacked to the pectoralis fascia medially and to the lateral pectoralis border laterally. Although the medial, lateral, and superior dermal wings of a standard wise pattern mastopexy maintain upper pole fullness, prevent lateral displacement, and reshape the breast parenchyma into a circular mound, the technique leaves an inverted T scar and does not reshape ptotic and sagged lower breast tissue. It only suspends the lower breast on the pectoralis muscle with autologous or cadaveric dermal slings. Circumareolar dermoglandular plication is another concept for mastopexy [8]. In this procedure, the epidermis is excised around the periareolar area, but neither full-thickness skin incision nor glandular excision is necessary for correction of the ptosis. Periareolar dermoglandular tissue is

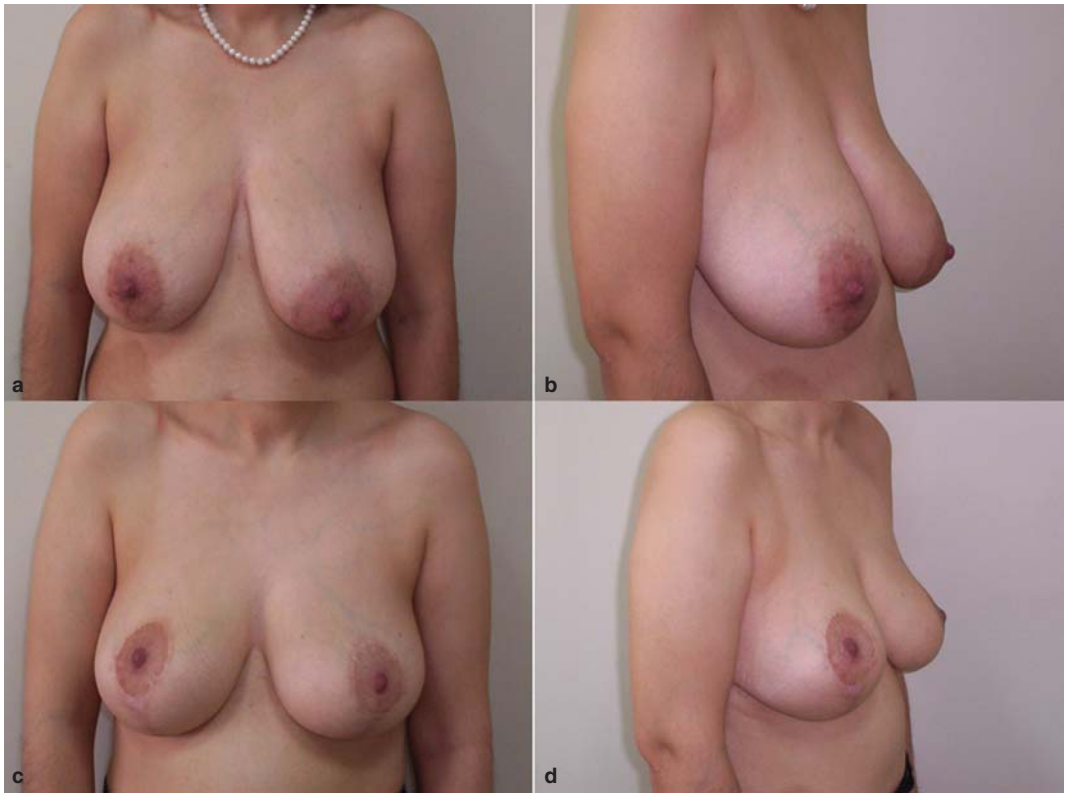

Figure 5. (*a*, *b*) Preoperative images of a 43-year-old patient, who had significant breast ptosis. During the operation, no breast tissue was excised. (*c*, *d*) Views 18 months postoperatively.

Figure 6. (*a*, *b*) Preoperative images of a 29-year-old patient, who had breast ptosis and hypertrophy. During the mastopexy 280 g breast tissue was removed from each breast. (*c*, *d*) Views 13 months postoperatively.

reduced and stabilised by a single or multiple plications, resulting in areolar and glandular reposition in the ptotic breast. The scar is left only in the circumareolar region. The technique does not involve any suspension procedure, or parenchymal reposition of the lower breast.

With the understanding of the three-dimensional shape of the breast and the soft-tissue dynamics of the ptosis, it becomes necessary that a mastopexy procedure should relocate breast mass from the caudal pole to fill out the deficient upper breast, and suspend the breast on the pectoral muscle to prevent recurrence of breast ptosis with time, as breast descent and loss of upper pole fullness are the major anatomical landmarks to be corrected in breast ptosis. Graf and Biggs [9] described a technique for mastopexy and reduction mammoplasty, which addressed creation of a mobile chest wall-based flap of breast tissue. The inferior pedicle flap based at the fifth to sixth intercostal spaces, which was totally freed from the lateral, medial, inferior, and superior tissues, was passed under a loop of the pectoral muscle. Experience with this technique included 390 patients in a period of 7 years, suggesting the permanence of this correction. Although a successful and stable breast projection has been achieved with this technique, there is a reluctance to use it because of the concerns of cancer detectability, preventing widespread acceptance. In 2006, Ritz et al. [10] introduced a new technique, fascial suspension mastopexy, with a similar flap design to Graf and Biggs's. A lower thoracic breast parenchymal flap was prepared in different sizes, which could be planned according to the tissue availability and the amount of breast projection needed. After the breast parenchymal flap was passed under the prepectoral fascia flap, which was usually 3 cm wide and 5 cm long to allow tunnelling the lower thoracic breast parenchymal flap, it was secured both to the prepectoral fascia and to the bipedicled prepectoral fascia flap. In the follow-up of 52 patients, who had fascial suspension mastopexy, it was observed that the technique achieved an excellent suspension of breast parenchyma, creating a projected breast shape with upper pole fullness and long-standing breast contour. In our opinion, in the techniques involving a lower breast parenchymal flap for suspension of the breast tissue, although suspension of the sagged lower breast was achieved successfully with the autoaugmentation of the lower and central breast, it seems that they are insufficient to create a full upper breast with the sagged breast tissue and to support the entire breast tissue against gravity.

Flap transposition is another surgical approach in the correction of breast ptosis by means of using the breast tissue as a biological implant to improve nipple–areola projection and upper pole fullness. Fayman [11] reported his personal technique called short scar mastopexy with flap transposition in which breast tissue was used as a transposition flap behind the nipple–areolar complex to increase its projection. In this technique, the inferior pole of the breast can be used either as a superiorly pedicled or inferiorly pedicled flap. Although the superiorly pedicled flap has some similarities to the dermoglandular hammock flap, there are significant differences in designing, placement, and elevation of the flap. This flap is very short, which includes breast tissue some 5 cm distal to the inferior border of the areola, so it cannot reach the upper pole. After the transposition, it increases only the projection of the central cone. During the dissection, there is no need to create a pocket to insert the flap for the augmentation of the upper pole,

so the de-epithelialised flap is sutured simply to the pectoralis fascia behind the nipple–areola complex.

The dermoglandular hammock flap was described by de la Plaza et al. [12] in 2005. The technique uses a transposition flap to fill the upper and central breast by relocating the lower breast tissue. An upper-pedicle dermoglandular flap is raised from the lower pole of the breast and transposed to the upper pole. The flap is fixed like a hammock to the pectoral fascia, and the donor defect, which extends laterally, is closed by approximation of the medial and lateral pillars. This makes it possible to augment the upper pole with sagged lower breast tissue, and to suspend the whole breast on the pectoral muscle with dermis for improving long-term breast projection and upper pole fullness. In our modification, the hammock flap design involves a longer and broader flap, so that it can reach more easily and effectively to the upper pole through the prepectoral pocket. It also carries more tissue from the lower pole of the breast to the upper, increasing the capability of filling-out both the breast cone behind the nipple–areola complex and the upper pole of the breast.

Our flap design changes the donor site and shape of the hammock flap. It extends from the inferior midline of the breast to the lateral breast, so in the distal part it is harvested from the lateral breast. After closing the donor site, a long suture line is left, extending from the midline of the lower breast to the lateral breast over the submammary fold. Our used flap is larger than the hammock flap in the distal part, involving a glandular extension, which is in a quadrangular shape, while the classical hammock flap ends in a triangular shape, resulting in reduced dimensions in the tip region of the flap. With the transposition, it carries less tissue from the lower breast to the upper, providing insufficient upper pole fullness. In our design, after the mastopexy, a short vertical scar is left on the lower breast. It is emphasised that the hammock flap is not appropriate in cases of marked ptosis. However, our flap is the most effective in the significant ptosis, because in these cases there is abundant tissue in the lower breast to be transferred to the upper pole. This approach is the least efficient in cases of minimal ptosis as there is a little tissue to fill the upper pole after transposition; however, this has the same effect as the classical hammock flap. This modification makes the hammock flap technique suitable for patients needing limited breast reduction. However, it was found to be unsuitable for patients who have significant breast hypertrophy, needing more than 300 g of glandular tissue resection. The inferior pole scar is in the vertical direction, the same as the vertical mammaplasty procedure and not in need of turning to the horizontal plane on the submammary fold to excise skin redundancy. However, there is a possibility of developing skin depression at the end of the vertical scar line when excessive resection of the breast tissue is made from the lower prepectoral area during the elevation of the flap, so a thin layer of breast tissue should be left over the prepectoral region adjacent to the submammary fold to avoid it.

With this modification, the dermoglandular suspension flap turns to be a more effective procedure and suitable for all types of ptosis, except for cases of insufficient mammary volume. As the sagged lower pole of the breast is used as a flap behind the nipple–areola complex and upper pole, it makes not only parenchymal reposition, but also autoaugmentation in the breast. Moreover, it suspends breast tissue over the pectoralis muscle with strong dermal support, leading to long-term maintenance of the breast shape.

Declaration of interest: The author reports no conflicts of interest. The author alone is responsible for the content and writing of the paper.

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